Heat Transfer Training Systems

Educational Training Equipment for the 21st Century

Bulletin 689-8D

H-6898
Thermal Radiation Demonstrator

Purpose

The Hampden **Model H-6898** Thermal Radiation Demonstrator enables the student to investigate fully the fundamental aspects of radiation heat transfer. Radiant energy emitted from various sources is absorbed by media with different characteristics.

Specifications

This unit is furnished with the necessary radiant energy emitter and instrumentation. These items include:

Cylindrical Radiator
Heatable from room temperature to 650°C with near blackbody characteristics.

Plane Surface Radiator
Heatable from room temperature to 204°C with near blackbody characteristics.

Point Type Optical Radiator (white)

Point Type Thermal Radiator (infrared)

Digital Temperature Display
Accurate to within ±0.9°C and calibrated for use with type T thermocouples.

Thermocouple Probes
Supplied are 3 type T thermocouple probes which are rated up to 350°C. Included are a general-purpose probe, a surface probe and a probe with a radiation shield.

Thermocouples
Type T (Copper-constantan)

Photometer (Light Meter)

Photoelectric cell with an integral meter.

Thermopile
Multijunction thermal detector calibrated to radiometer.

Radiometer

Description

This unit comes supplied with a student manual, teacher's manual, and operating instructions. All of the experimental fixtures necessary to perform any of the experiments listed in the student manual are supplied. These fixtures include a control panel with instrumentation and power supplies, 48" scaled linear track for mounting the various radiators, and test geometries.

The test geometries are constructed out of different metals and have emissivities from 0.03 to 0.98. These test geometries also come in different sizes and shapes, namely flat plates and circular disks. Radiation shields are provided which include high temperature glass and low temperature Lexan® shields. Additionally, all test geometries have temperature labels on them to indicate if the unit is hotter than 40°C.

Computer Data Logging

This feature adds meter devices, analog outputs, and thermocouples into the system. One interface package containing National Instruments I/O modules and LabVIEW® templates for control software are provided for interfacing into a PC computer through the USB port.

LabVIEW® Control Software and Computer are included.

Specify **Model H-6898-CDL**

Experiment Capability

This unit will allow the student to verify experimentally the important laws governing radiant energy heat transfer, namely:

- Planck's Law of Radiation
- Stefan-Boltzmann Law
- Wien's Displacement Law
- Kirchoff's Law of Thermal Radiation
- Newton's Law of Cooling
- Lambert's Cosine Law
- Lambert's Law of Absorption

In addition, the student will be able to study the following areas of radiation heat transfer:

- Blackbody Radiation
- Non-Blackbody Radiation
- Radiation Shape Factor
- Radiation Shield
- Radiation Heat Transfer Coefficient
- Radiation Effects on Temperature Measurement
- Three-Dimensional Radiation Profile of an Emitter
- Infrared and Optical Absorptivities
- Optical Energy Intensity (Photometer)
- Radiation Communications Network
- Numerical Solution Methods

Services Required

Instrument Air

Input Voltage: 120VAC-1∅-60 HZ

All Hampden units are available for operation at any voltage or frequency

Hampden® ENGINEERING CORPORATION

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